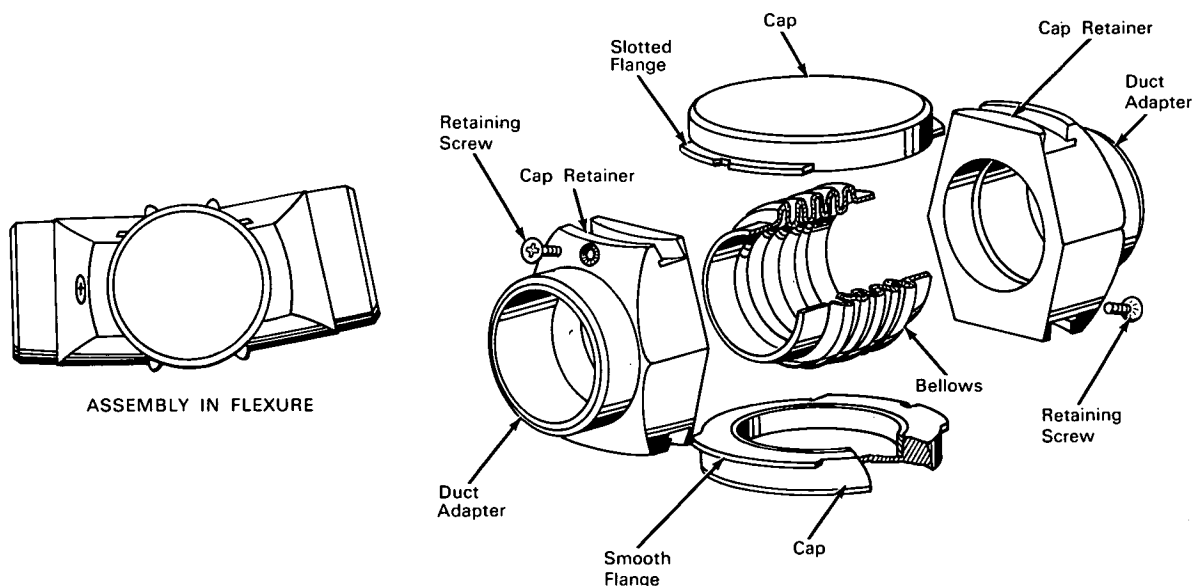


NASA TECH BRIEF



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Lightweight Hinged Bellows Restraint Has High Load Capacity



The problem: To accommodate high angular stresses in fluid-handling ducts. Past devices have used rigid arms and clevis pins on either side of a bellows with the arms pinned at the center of the bellows. This hinge action, as angular load increases, concentrates great stress at the inside corners of the arms and requires large, bulky material to safely spread the imposed force.

The solution: A lightweight hinged bellows restraint that transmits angular stress to points closer to the center of axis and spreads it over a much more rigid configuration.

How it's done: The hinged bellows restraint consists of a bellows that is firmly restrained between two retainers by two circular caps, each of which is secured at one end only by a slotted flange and retaining screw. The upper cap slotted flange and retaining screw are at one end of the assembly and the lower cap slotted flange and retaining screw are at the other. Each cap has a smooth flange at the side opposite the slotted flange. The retainers are in the tops and bottoms of two duct adapters and are in the form of semi-circular captive slots designed to receive the cap flanges.

The unit is assembled by inserting the bellows into the two duct adapters, holding each cap sequentially with

(continued overleaf)

its flange 90° from the illustrated position, rotating each cap 90° so as to fully engage its flanges with the adapter mating receivers, and securing each slotted flange with its retaining screw. With the unit assembled, the two smooth cap flanges and their mating adapter retainer slots are free to move laterally relative to one another in arcs restricted only by the angular limitations of the bellows.

Note: A dry lubricant such as molybdenum disulfide can be used on the bearing areas of the cap flanges and retainers to reduce friction and increase wear life.

Patent status: Title to this invention has been waived under the provisions of the National Aeronautics and Space Act [42 U.S.C. 2457(f)], to North American Aviation, Inc., 6633 Canoga Avenue, Canoga Park, California.

Source: E. E. Imus of North American Aviation, Inc.,
under contract to Western Operations Office
(WOO-151)